

DRAWINGS ATTACHED

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(54) EXTRUSION COATING METHOD AND APPARATUS

(71) We, WIGGINS TEAPE RESEARCH & DEVELOPMENT LIMITED, a British Company, of Gateway House, 1 Watling Street, London, E.C.4, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to an extrusion coating method and apparatus, and is particularly concerned with a method of and apparatus for coating, for example by extrusion, thermoplastic resin onto both sides of a sheet material, for example a paper web.

A known method of extrusion coating both sides of a sheet material is to lead the sheet from an unwind position to a first coating head comprising a pressure roll, a chill roll, and an extruder and die, which coats the top surface of the sheet with, for example, thermoplastic resin. The sheet is then turned through 180° by means of guide rolls so that it travels in the opposite direction to its initial direction, and is then fed to a second coating head which coats the now uppermost uncoated surface of the sheet. The sheet is then turned to pass over the top of the second coating head, by means of guide rolls, to again travel in its initial direction, and is fed to a rewind position.

Disadvantages of this method are that the feeding of the sheet through the coating line is complicated; there is a likelihood of scratching the sheet due to the number of guide rolls used; and due to the length of the line there is considerable wastage of the sheet at a breakdown and during initial feeding of the line. There is also a likelihood of contamination of the sheet due to the length of sheet between the unwind and rewind positions.

45 According to one aspect of this invention there is provided a method of coating ther-

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moplastic resin onto both sides of a sheet material, comprising feeding the sheet through a first coating station at which a coating is applied to one side of the sheet, then passing the sheet around at least one non-rotatory turner bar to bring the other side of the sheet to face in the same direction as the one side of the sheet when passing through the first coating station, and thereafter feeding the sheet through a second coating station at which a coating is applied to the other side of the sheet.

According to another aspect of this invention there is provided apparatus for carrying out a method according to the immediately preceding paragraph including a first coating station, at least one non-rotatory turner bar, and a second coating station, the first and second coating stations and the turner bar or bars together defining a coating line for a sheet to be coated.

Preferably the apparatus also includes an unwind reel from which the sheet is fed to the first coating station, and a rewind reel to which the sheet is fed from the second coating station.

Otherwise the first coating station can be fed directly from a machine manufacturing the sheet, and if required the sheet can be fed from the second coating station to a further sheet treatment apparatus, for example cutting, laminating or embossing apparatus.

It is clearly preferable for the sheet to pass around the turner bar or bars with the then one coated side facing away from the turner bar or bars, thus preventing damage of the coating by the turner bar or bars. The chance of such damage can be further lessened by the use of a turner bar or bars in the form of a perforated tube through which, in use, air under pressure is passed, the air leaving the perforations in the tube supporting the sheet out of contact with the tube.

The method and apparatus of the present invention are particularly suitable for use

in the production of a photographic base material comprising a paper substrate having a coating of polyethylene on each side. However, other substrates can be coated, for example paperboard, metal foil or fabric. Further, other thermoplastic resins can be used, for example polypropylene, ethylene vinyl, acetate copolymers, polyvinyl chloride or polyvinylidene chloride.

Obviously it is possible for the coatings applied to the two sides of the sheet to be of different thermoplastic resins and for other parameters of the coatings to differ, for example the applied coating weight, achieved by differences in the thicknesses of the coatings or by differences in the densities of the coating mixes; the colour of the coatings, achieved by the addition of pigments or dye-stuffs to the coating mixes; or the width of the coatings.

One embodiment of apparatus in accordance with the present invention will now be described by way of example with reference to the drawing which is a schematic perspective view of the apparatus.

Referring to the drawing, a web of paper 1 passes from an unwind reel 2 to a first coating station comprising a pressure roll 3 and a chill roll 4 which is urged, either hydraulically or pneumatically, against the pressure roll 3 to form a nip 5. The chill roll 4 simultaneously serves as a drive roll, being driven by means not shown, and thus draws the web 1 from the unwind reel 2. The first coating station also includes an extrusion head 7 from which a thermoplastic resin is extruded into the nip 5 and thus onto the upper (as seen in the drawing) side of the web 1. The web 1 then passes under the chill roll 4 which cools and sets the thermoplastic resin coating, over a guide roll 8, and then through a beta-ray gauge 9 which determines the amount of resin applied at the first coating station.

From the gauge 9 the web 1 passes round a non-rotatory turner bar 10 which has its longitudinal axis parallel to the plane of the web 1 and at an angle of 45° to the transverse direction of the web 1. The web 1 is thus turned over so that its underside at the first coating station becomes its upperside after the turner bar 10, and the direction of travel of the web 1 is turned through 90°.

From the turner bar 10 the web 1 passes to a second coating station comprising a pressure roll 11 and a chill roll 12 together forming a nip 13, an extrusion head 14 and a guide roll 15. The second coating station serves to coat the now upperside of the web 1, and the web 1 is then passed to a second beta-ray gauge 16 which determines the amount of resin applied at the second coating station. The web 1, now coated on both sides with thermoplastic resin, is then wound onto a rewind reel 17 which can be driven

to assist in drawing the web 1 through the apparatus.

The tension in the web 1 as it passes through the apparatus can be controlled by the use of two dancer rolls (not shown) positioned one each side of the turner bar 10, or by other known means.

Although in the embodiment described above a single turner bar is used having its longitudinal axis at an angle of 45° to the cross direction of the web, it will be appreciated that the turner bar can be positioned with its longitudinal axis at other angles to the transverse direction of the web, this resulting in the direction of travel of the web being turned through other than 90°. It has been found that for practical reasons the angle is preferably in the range 12° to 70°.

It will also be appreciated that by the use of any odd number more than one, of turner bars the direction of travel of the web through the apparatus can be turned through any desired angle while still turning the web over between the first and second coating stations. For example, by the use of three turner bars each with its longitudinal axis at an angle of 60° to the cross-direction of the web, the direction of travel of the web can be the same through both coating stations.

WHAT WE CLAIM IS:—

1. A method of coating thermoplastic resin onto both sides of a sheet material, comprising feeding the sheet through a first coating station at which a coating is applied to one side of the sheet, then passing the sheet around at least one non-rotatory turner bar to bring the other side of the sheet to face in the same direction as the one side of the sheet when passing through the first coating station, and thereafter feeding the sheet through a second coating station at which a coating is applied to the other side of the sheet.

2. A method as claimed in Claim 1, in which the coatings on both sides of the sheet are applied by extrusion.

3. Apparatus for carrying out a method as claimed in Claim 1 or Claim 2, including a first coating station, at least one non-rotatory turner bar, and a second coating station, the first and second coating stations and the turner bar or bars together defining a coating line for a sheet to be coated.

4. Apparatus as claimed in Claim 3, including only one turner bar, the longitudinal axis of the turner bar being parallel to the plane of a sheet passing through the apparatus and at an angle in the range 12° to 70° relative to the transverse direction of a sheet passing through the apparatus.

5. Apparatus as claimed in Claim 4, in which the longitudinal axis of the turner bar is at an angle of 45° relative to the trans-

verse direction of a sheet passing through the apparatus.

- 5 6. Apparatus as claimed in Claim 3, including an odd number more than one, of turner bars.
7. Apparatus as claimed in any one of Claims 3 to 6, including an unwind reel from which the sheet is fed to the first coating station, and a rewind reel to which the sheet is fed from the second coating station.
- 10 8. Apparatus is claimed in any one of Claims 3 to 7, in which the or each turner bar is in the form of a perforated tube through which, in use, air under pressure is passed whereby air leaving the perforations in the tube supports the sheet out of contact with the tube.
- 15 9. Apparatus as claimed in any one of Claims 3 to 8, including two dancer rolls positioned one each side of the turner bar or bars.
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10. Apparatus for coating thermoplastic resin onto both sides of a sheet material, substantially as hereinbefore described with reference to the drawing.

11. A sheet material having a thermoplastic resin coating on both sides made by a method as claimed in Claim 1 or Claim 2 or made with apparatus as claimed in any one of Claims 3 to 10.

12. A sheet material according to Claim 11, in which the sheet material is paper.

13. A sheet material as claimed in Claim 12, in which the thermoplastic resin coatings are of polyethylene.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

